

We Claim

1. A method for compensating Doppler shift in a telecommunication system, where at least one user terminal is moving in relation to a network element, the method comprising:

measuring a received uplink signal;

estimating an amount of Doppler frequency compensation for at least one downlink signal related to a user terminal based upon a measured received uplink signal; and

compensating a Doppler shift for at least one downlink signal related to the user terminal by shifting a frequency of the signal according to the estimated amount of Doppler frequency compensation.

2. A method for compensating Doppler shift in a telecommunication system, where at least one user terminal is moving in relation to a network element and where there are at least two radio cells, one of them being a handover source cell and another a handover target cell, the method comprising:

measuring a received uplink signal in a source cell;

estimating in the source cell an amount of Doppler frequency compensation for at least one downlink signal related to a user terminal based upon a measured received uplink signal;

compensating a Doppler shift in the source cell for at least one downlink signal related to the user terminal by shifting a frequency of the signal according to the estimated amount of Doppler frequency compensation;

informing a handover target cell of a required Doppler shift compensation while performing a handover;

estimating an amount of Doppler frequency compensation for at least one user terminal related downlink signal of the handover target cell utilizing the information on the required Doppler shift compensation communicated from the source cell, and angles of velocity; and

compensating a Doppler shift in the handover target cell for at least one downlink signal related to the user terminal by shifting a frequency of the signal according to the amount of Doppler frequency compensation estimated in the handover target cell.

3. The method of claim 1, wherein the estimation takes into account the previously made Doppler effect compensation.

4. The method of claim 1, wherein the estimation of Doppler frequency compensation utilizes information on system geometry.

5. The method of claim 2, wherein the estimation of Doppler frequency compensation utilizes information on system geometry.

6. The method of claim 1, wherein the Doppler frequency compensation is performed for selected cells, if there are cells for user terminals located in a predetermined location.

7. The method of claim 2, wherein the received uplink signal measured in a handover source cell is informed to the handover target cell for initializing the Doppler frequency compensation estimation.

8. The method of claim 1, wherein the estimated amount of the Doppler frequency compensation is filtered or weighted for increasing estimation accuracy.

9. A data transmission system for compensating Doppler shift in a telecommunication system in which system at least one user terminal is moving in relation to a network element, the system comprising:

means for measuring a received uplink signal;

means for estimating an amount of Doppler frequency compensation for at least one downlink signal related to a user terminal based upon the measured received uplink signal; and

means for compensating a Doppler shift for at least one downlink signal related to the user terminal by shifting the frequency of the signal according to the estimated amount of Doppler frequency compensation.

10. A data transmission system for compensating Doppler shift in a telecommunication system in which system at least one user terminal is moving in relation to a network element, and in which system there are at least two radio cells, one of them being a handover source cell and another a handover target cell, the system comprising:

means for measuring a received uplink signal in a source cell;

means for estimating in the source cell an amount of Doppler frequency compensation for at least one downlink signal related to a user terminal on the basis of the measured received uplink signal;

means for compensating the Doppler shift in the source cell for at least one downlink signal related to the user terminal by shifting the frequency of the signal according to the estimated amount of Doppler frequency compensation;

means for informing a handover target cell of the required Doppler shift compensation while performing a handover;

means for estimating the amount of Doppler frequency compensation for at least one user terminal related downlink signal of the handover target cell utilizing the information on the required Doppler shift compensation communicated from the source cell and angles of velocity; and

means for compensating a Doppler shift in the handover target cell for at least one downlink signal related to the user terminal by shifting frequency of the signal according to the amount of Doppler frequency compensation estimated in the handover target cell.

11. The system of claim 9, further comprising means for taking into account in the estimation the previously made Doppler effect compensation.

12. The system of claim 9, further comprising means for utilizing, in the estimation of Doppler frequency compensation, information on system geometry.

13. The system of claim 10, further comprising means for utilizing, in the estimation of Doppler frequency compensation, information on system geometry.

14. The system of claim 9, further comprising means for performing the Doppler frequency compensation for the selected cells, if there are cells for user terminals located in a predetermined location.

15. The system of claim 10, further comprising means for informing the received uplink signal measured in a handover source cell to the handover target cell for initializing the Doppler frequency compensation estimation.

16. The system of claim 9, further comprising means for filtering or weighting the estimated amount of the Doppler frequency compensation for estimation accuracy.

17. A network element for compensating Doppler shift, said element comprising:

means for receiving measurement results regarding uplink signals;

means for estimating an amount of Doppler frequency compensation for at least one downlink signal based upon a measured uplink signal; and

means for compensating a Doppler shift for at least one downlink signal by shifting a frequency of the signal according to the estimated amount of Doppler frequency compensation.

18. A network element for compensating Doppler shift in a telecommunication system in which system there are at least two radio cells, one of them being a handover source cell and another a handover target cell, the network element comprising:

means for receiving measurement results regarding uplink signals in a source cell;

means for estimating in the source cell the amount of Doppler frequency compensation for at least one downlink signal based upon a measured uplink signal;

means for compensating the Doppler shift in the source cell for at least one downlink signal by shifting the frequency of the signal according to the estimated amount of Doppler frequency compensation;

means for informing the handover target cell of a required Doppler shift compensation while performing a handover;

means for estimating the amount of Doppler frequency compensation for at least one downlink signal of the target cell utilizing the information on the required Doppler shift compensation communicated from the source cell and angles of velocity; and

means for compensating the Doppler shift in the target cell for at least one downlink signal by shifting a frequency of the signal according to the amount of Doppler frequency compensation estimated in the target cell.

19. The network element of claim 17, further comprising means for taking into account in the estimation a previously made Doppler effect compensation.

20. The network element of claim 17, further comprising means for utilizing in the estimation of Doppler frequency compensation information on system geometry.

21. The network element of claim 18, further comprising means for utilizing in the estimation of Doppler frequency compensation information on system geometry.

22. The network element of claim 17, further comprising means for performing the Doppler frequency compensation for the selected cells, if there are cells for user terminals located in a predetermined location.

23. The network element of claim 18, further comprising means for informing the received uplink signal measured in a handover source cell to the

handover target cell for initializing the Doppler frequency compensation estimation.

24. The network element of claim 17, further comprising means for filtering or weighting the estimated amount of the Doppler frequency compensation for obtaining more accurate estimation.